PLANNING FOR SUCCESS

102

System Design and Layout of your Dynon or Advanced Flight System in Experimental Aircraft

Presenter – David Weber

- Engineer – Dynon Avionics/Advanced
- A&P IA
- Private Pilot
- Airplane Builder
  - Sonex (plans built)
  - Sportman (team build)
  - RV-7
- EAA Technical Counselor
- Senior Hardware Designer
- Dynon Hangar Manager

Planning for Success 102– Outline

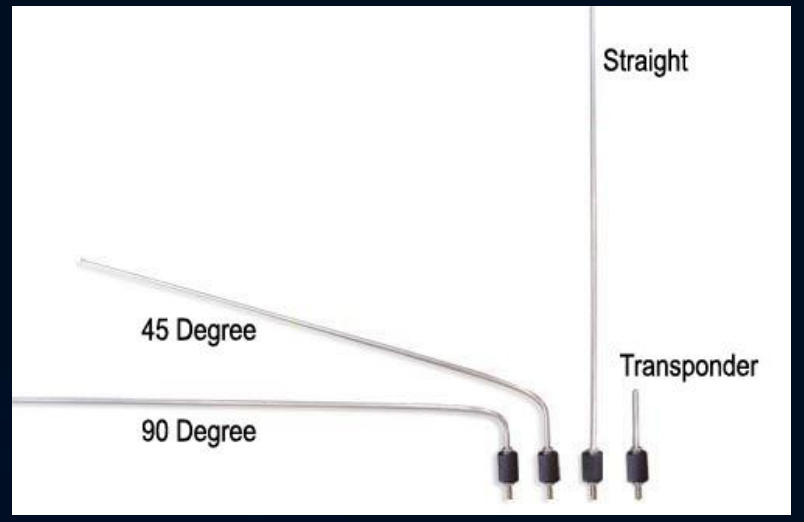
- Mission
- Installation Fundamentals
  - COM Radio
  - ADS-B Receiver
  - Pitot/AOA Tube and Static Ports
  - Servo's
- Tools for Success
- "Hold My Beer…"
- Information Resources

Installation Fundamentals – *COM Radio*

- SV-COM-PANEL
  - Required component (may be required by some regulatory agencies)
  - Dsub network (D9) and direct connection to transceiver (D15)
- Remote Transceiver – extreme vibration is undesirable
  - Avoid heat
  - Locate as close to transmitting antenna as practical
  - Serial Network connection to SkyView (D25)
  - TNC connector to antenna
- Do Not transmit without antenna connected!

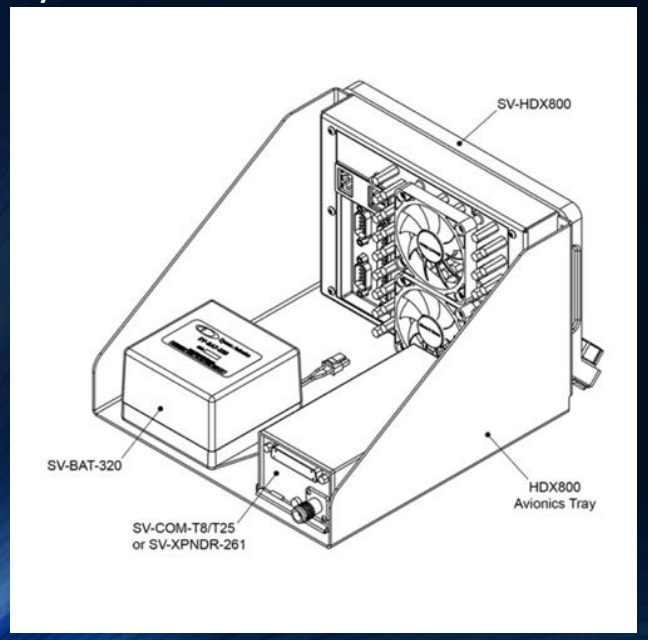
Installation Fundamentals – *COM Radio*

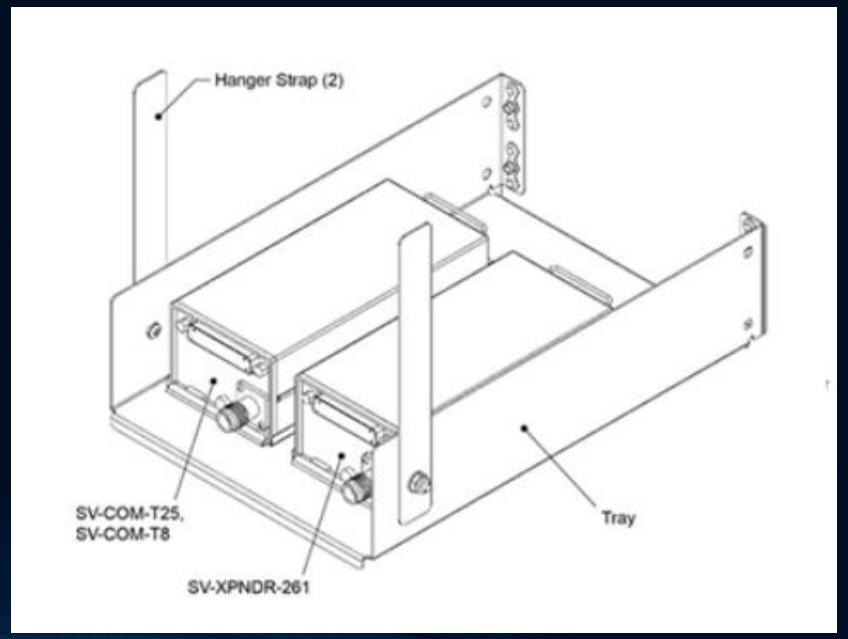
- Antenna
  - Minimum 48" from any ADF or 121.5 ELT antenna
  - Minimum 24" from transponder or GPS receiving antenna
  - If installing two COM antenna's, locate as far apart as practical
  - Use quality RG400 Coax and avoid bend radius less than 1"
  - Ground to metal skin or square ground plane

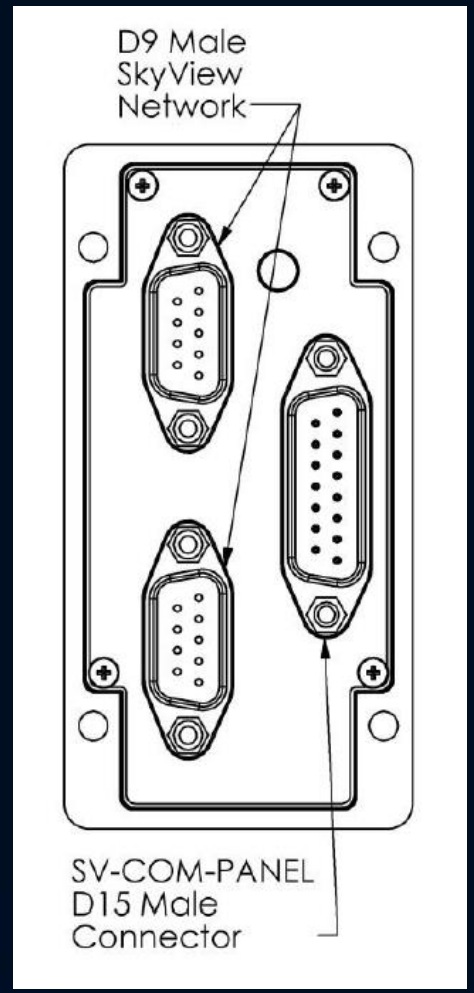


Installation Fundamentals – *COM Radio*

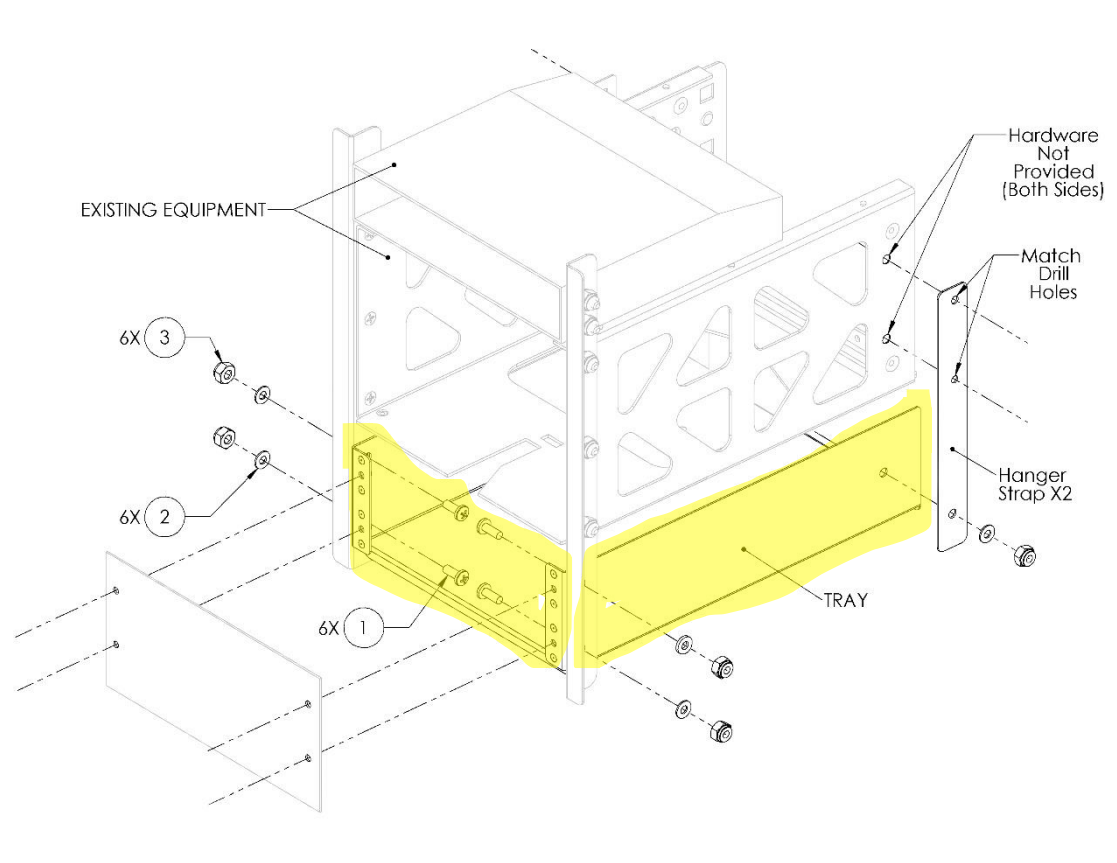
- Power
  - 10-30 VDC
  - 2.5 amp drawat 14 VDC
  - Connect ground directly to ground bus
  - 20 AWG recommended for power and ground, all other 22 AWG
  - Dynon does not sell a COM wiring harness





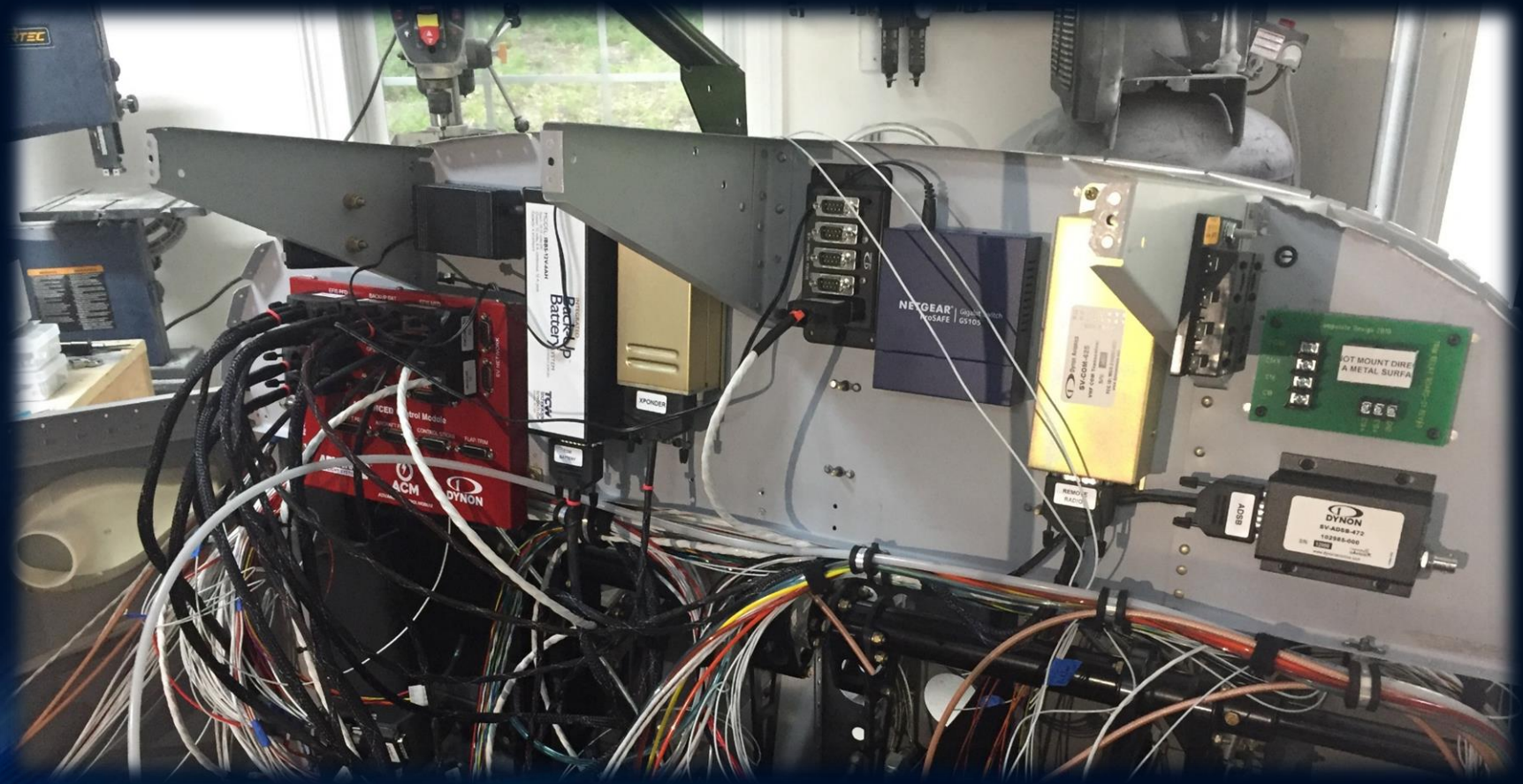


Installation Fundamentals – ***COM Radio***



Installation Fundamentals – ***COM Radio***

QUESTIONS?


Backup Battery
XPONDER
NETGEAR
ProSAFE
GS105
ACM
DYNON
DYNON
SV-ADSB-472
ADSB

Installation Fundamentals – *ADS-B (SV-ADSB-472)*

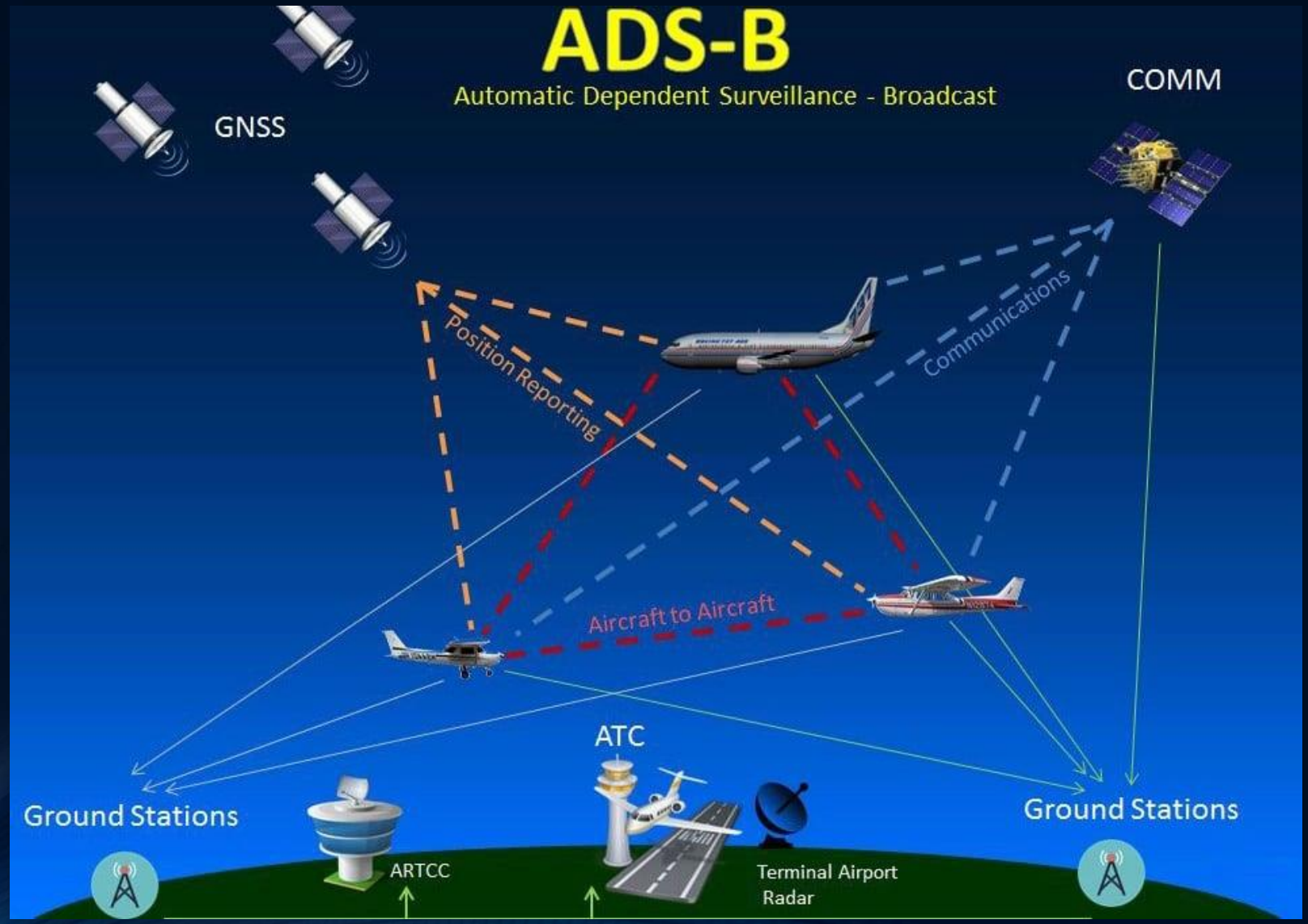
- Avoid extreme vibration
- Avoid heat
- Locate as close to antenna as practical
- Dynon sells premade harness
- Serial network connection to SkyView
- BNC connector to antenna
- Transponder that meets ADS-B Out specifications required
- This is a receiver only – Dual band 978MHz & 1090 MHz
- Power 10-30 VDC
- 0.05 A draw @ 14VDC

Installation Fundamentals – *ADS-B (SV-ADSB-472)*

- Antenna
  - Minimum 48” from any ADF or 121.5 ELT antenna
  - Minimum 24” from transponder antenna
  - Can not share transponder antenna
  - Use quality RG400 Coax and avoid bend radius less than 1”
  - Ground to metal skin or square ground plane
  - Mount on bottom surface of aircraft and vertical with aircraft in flight
  - Highly recommend mounting “doubler”

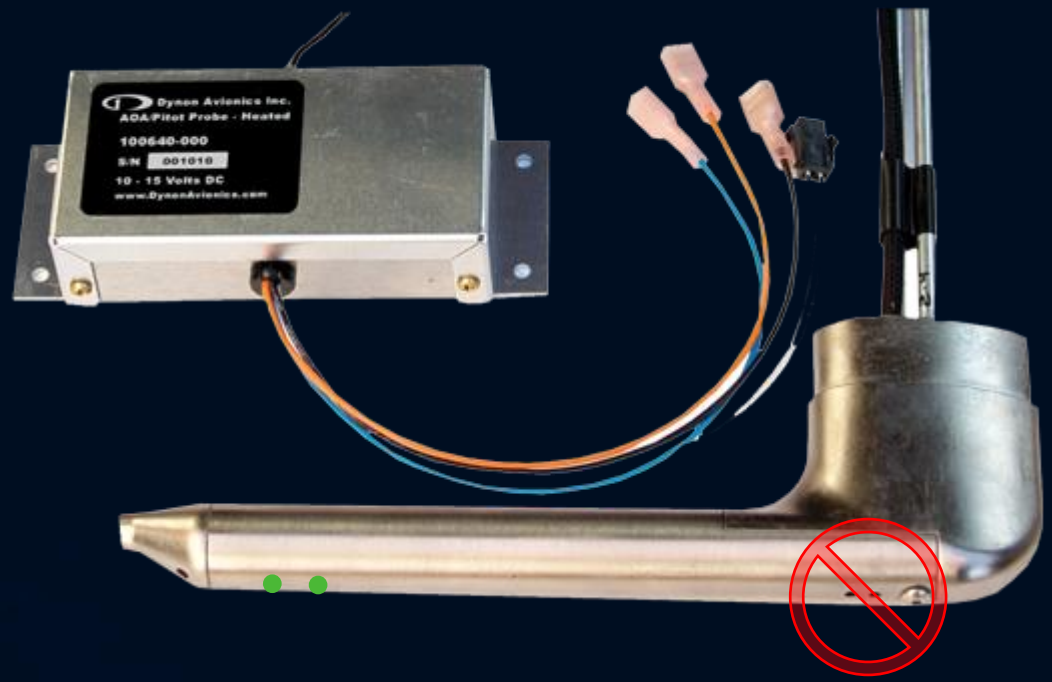
Installation Fundamentals – *ADS-B (SV-ADSB-472)*

QUESTIONS?

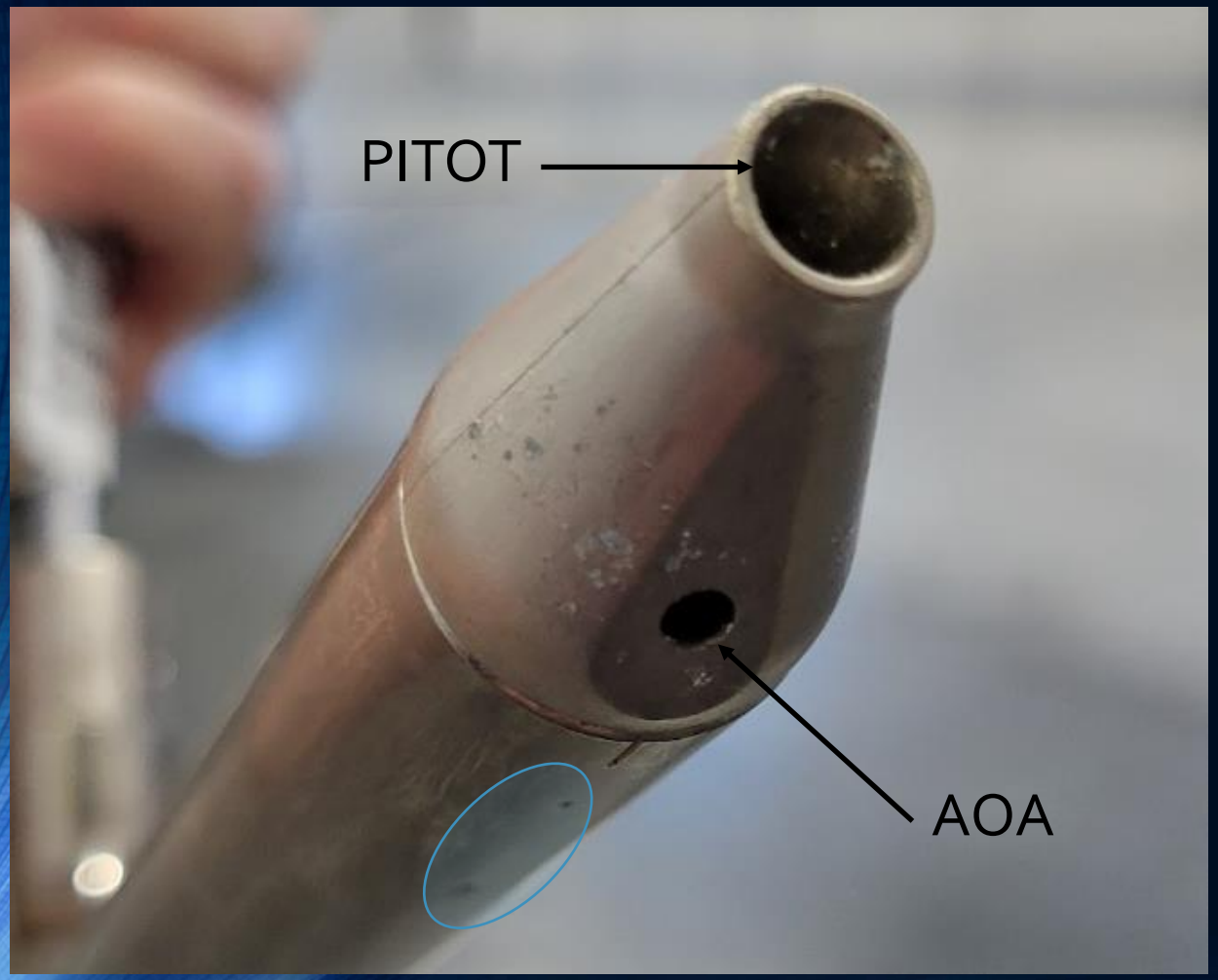

ADS-B
Automatic Dependent Surveillance - Broadcast
GNSS
COMM
Position Reporting
Communications
Aircraft to Aircraft
ATC
Ground Stations
Ground Stations
ARTCC
Terminal Airport
Radar

Installation Fundamentals – *Pitot/AOA Tube*

- Location on Aircraft is critical for both probe and ports
- Orientation and direction is critical to AOA feature on probe
- There is an up and down for the probe
- Rigid mounting
  - Icing
  - Bumping
- No network connection to SkyView
- Dynon Pitot Mast
- Dynon Pitot Static Installation Kit
- Heated Probe requires 10-14 VDC (will not work with 28 VDC)
- Draws 10.0 A at 12 VDC



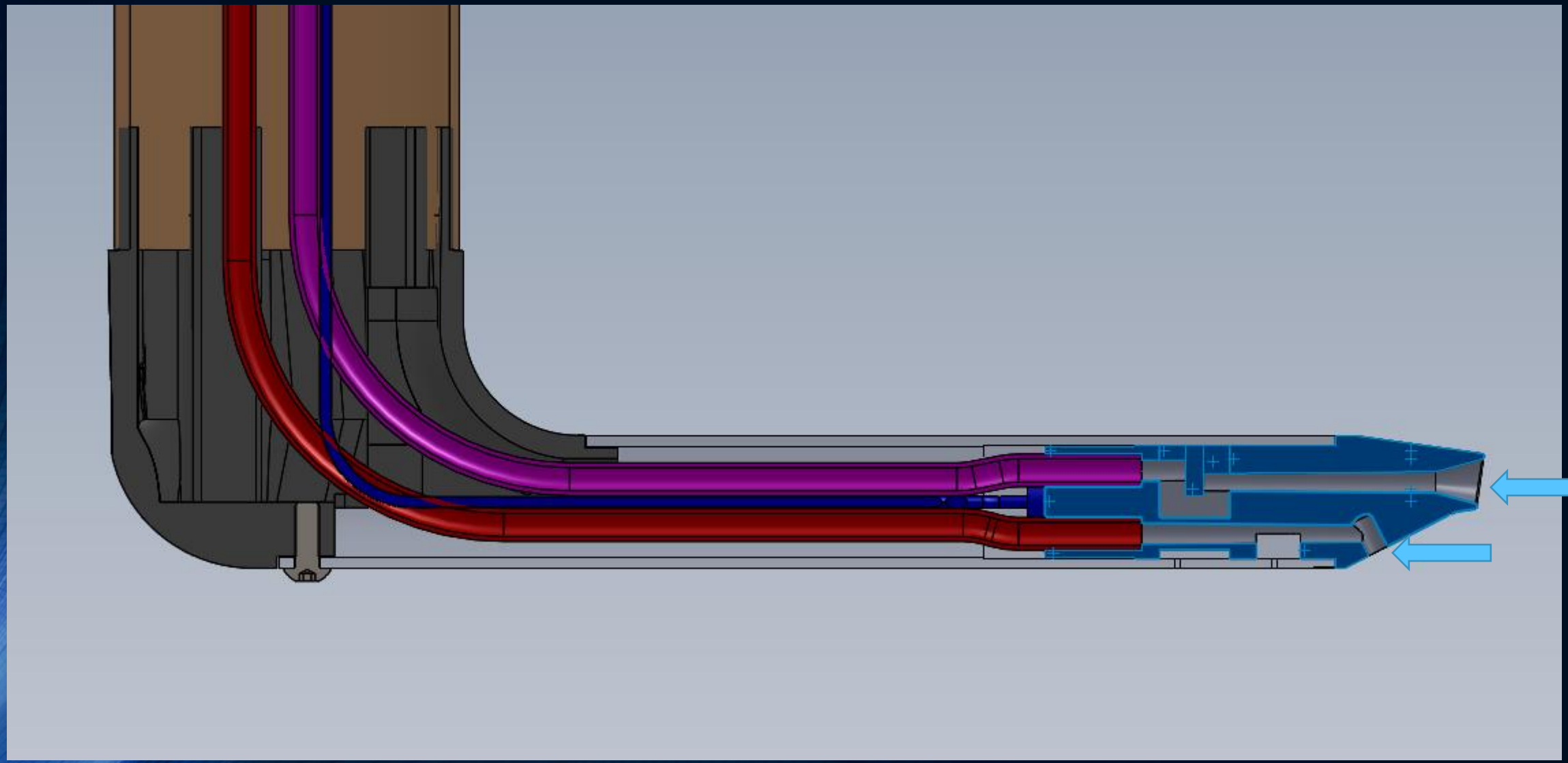
Installation Fundamentals – *Pitot/AOA Tube*
How it works



- Pitot and AOA air are pressure, not flow (kind of)
- Drain holes must remain clear of any obstruction for proper operation
- AOA "Flat" has a purpose
- Heated pitot tube require special attention
  - Use large gauge wire
  - Largest current draw is on start up
  - Heating coils cycle due to demand (logic)

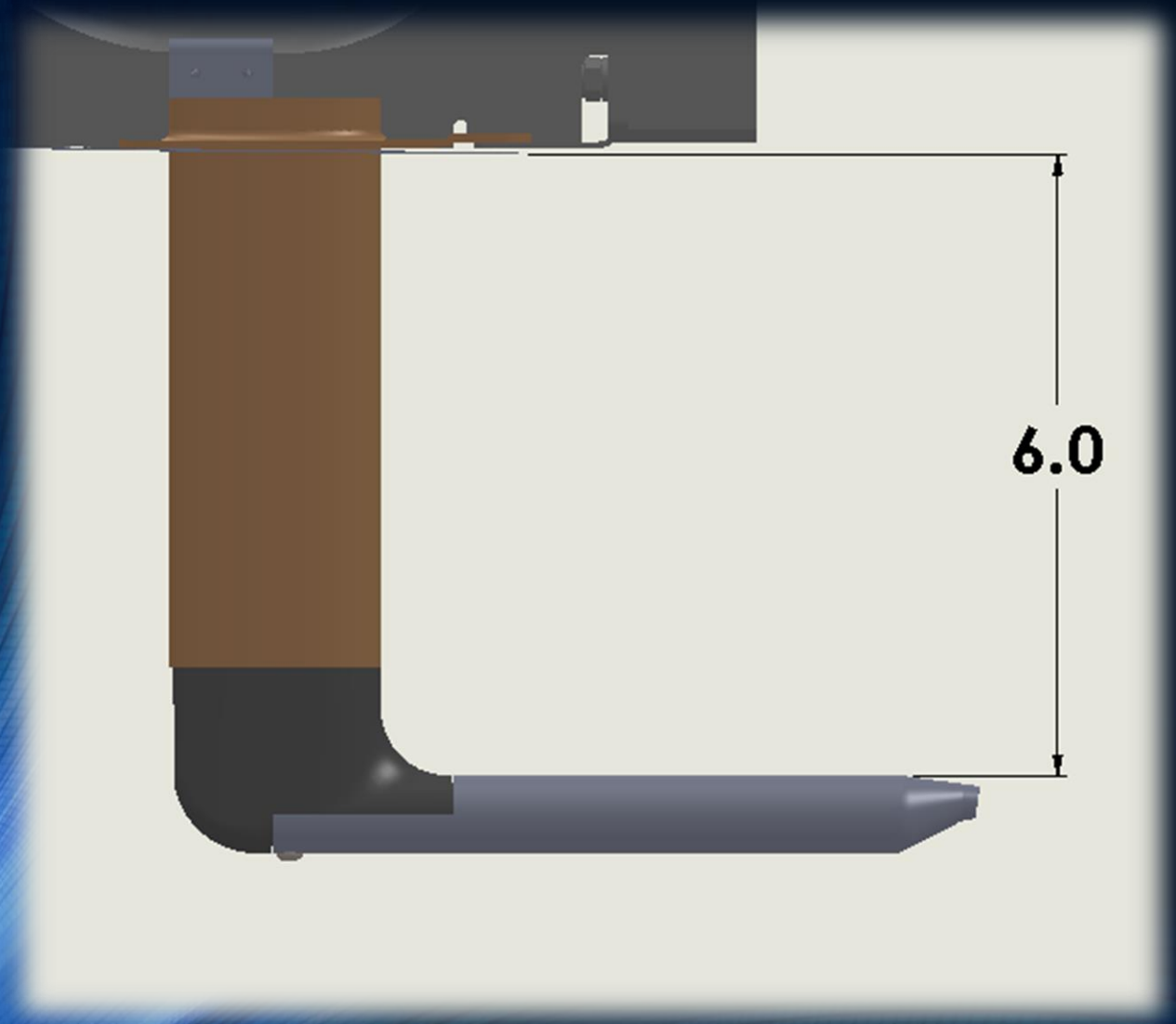
Installation Fundamentals – *Pitot/AOA Tube*

Unheated Pitot Tube Cut-away



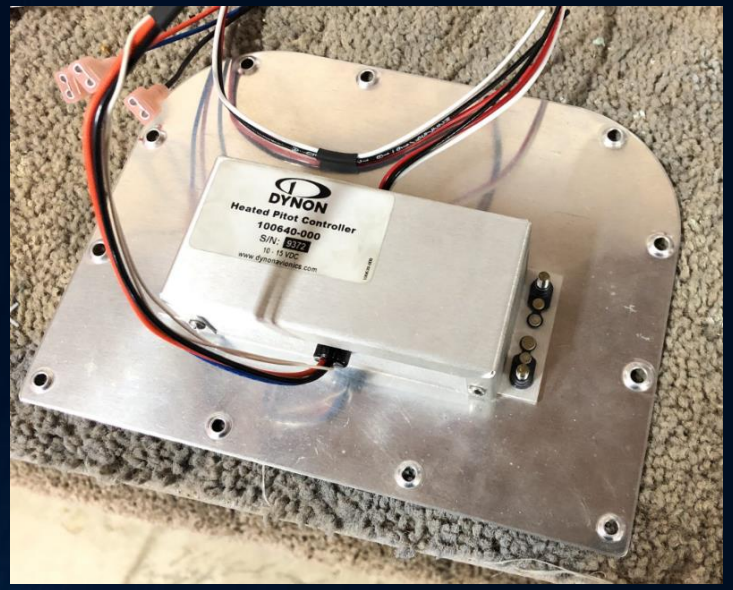
Installation Fundamentals – ***Pitot/AOA Tube***
Wing Offset

Installation Fundamentals – *Pitot/AOA Tube Pitot Mast Mounting*



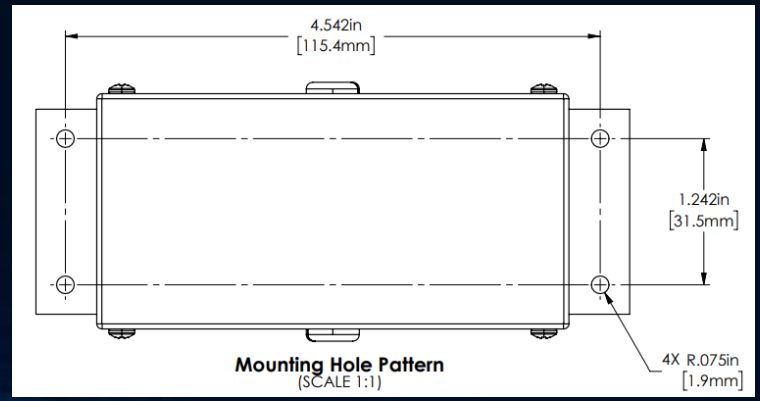
- The further away from the structure the better
- Consider pitot damage when mounting
- 6.0” is very reasonable
- 2.0” is not recommended
- Mount rigidly – to structure not just skin
  - Resonance
  - Ice
  - Impact

Installation Fundamentals – ***Pitot/AOA Tube Heated Pitot***



Recommended wire gauge for runs, given 10-amp peak current	
Run length	**Gauge**
~3.5' wiring included with units	
4' – 16'	14 AWG
17' – 24'	12 AWG
25' – 40'	10 AWG
Based on recommendations in FAA AC 43.13-1B, page 11-30	

- Mount controller as close as practical
- 18AWG x 42"L wire provided from controller to pitot
- If longer run is needed refer to chart
- Only applies to BLU, ORG or BLK wires
- Mount for cooling



QUESTIONS?

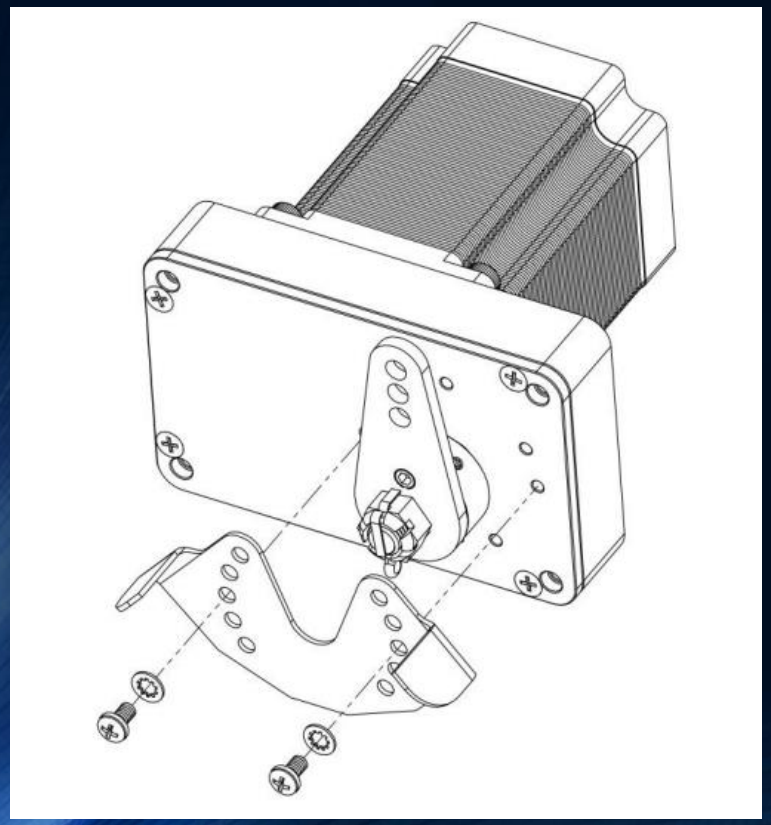
Mr. Pitot

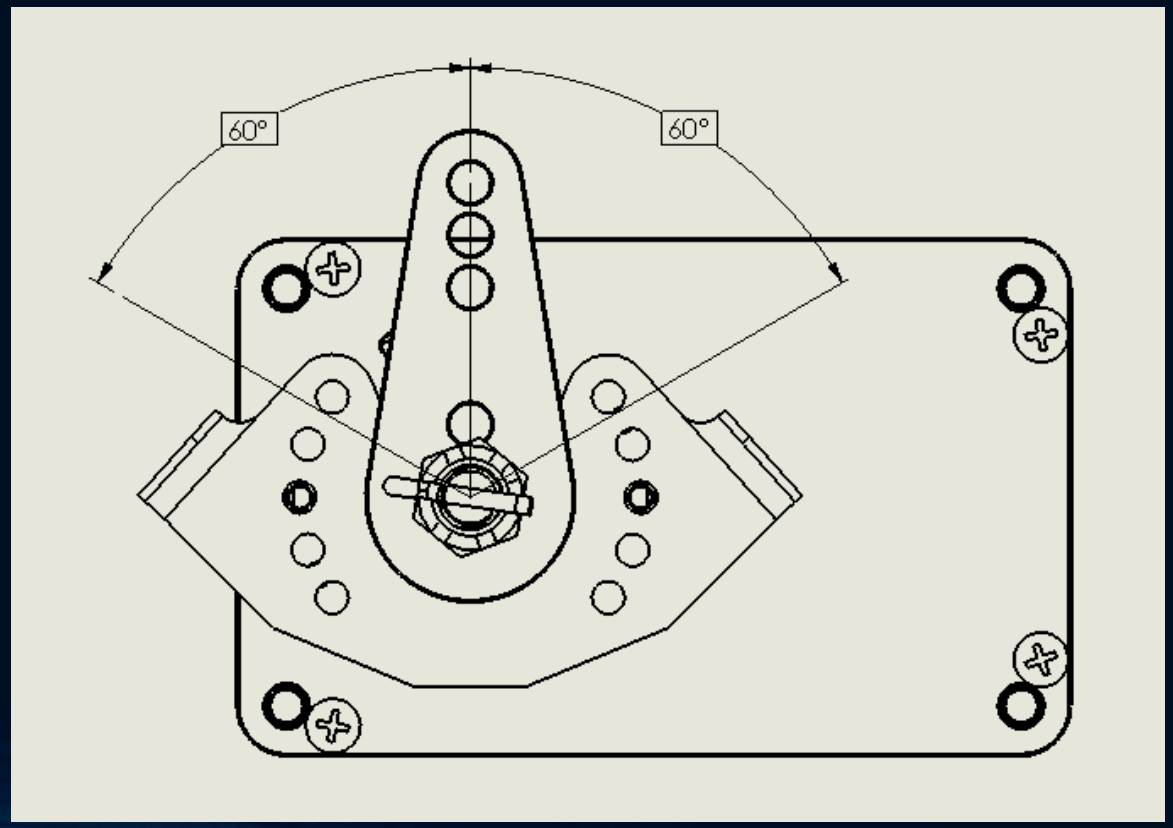
Installation Fundamentals – ***Servo's***

- Location must allow the servo arm and associated linkage to move freely through the entire range of travel
- Do not allow the servo arm to travel more than ±60° from neutral throughout the control system's range of travel. Note that this requirement only applies to arm servos and not capstan servos
- Leave room for all mounting hardware, including brackets, fasteners, linkages, etc.
- Leave room for electrical connections
- Verify full control throws after installation

Installation Fundamentals – ***Servo's Limiting Bracket***

- Use the aircraft's control stops for servo limits…DO NOT use the limiting bracket as the control surface hard stop!
- Use only the hardware supplied by Dynon to mount the Limiting Bracket

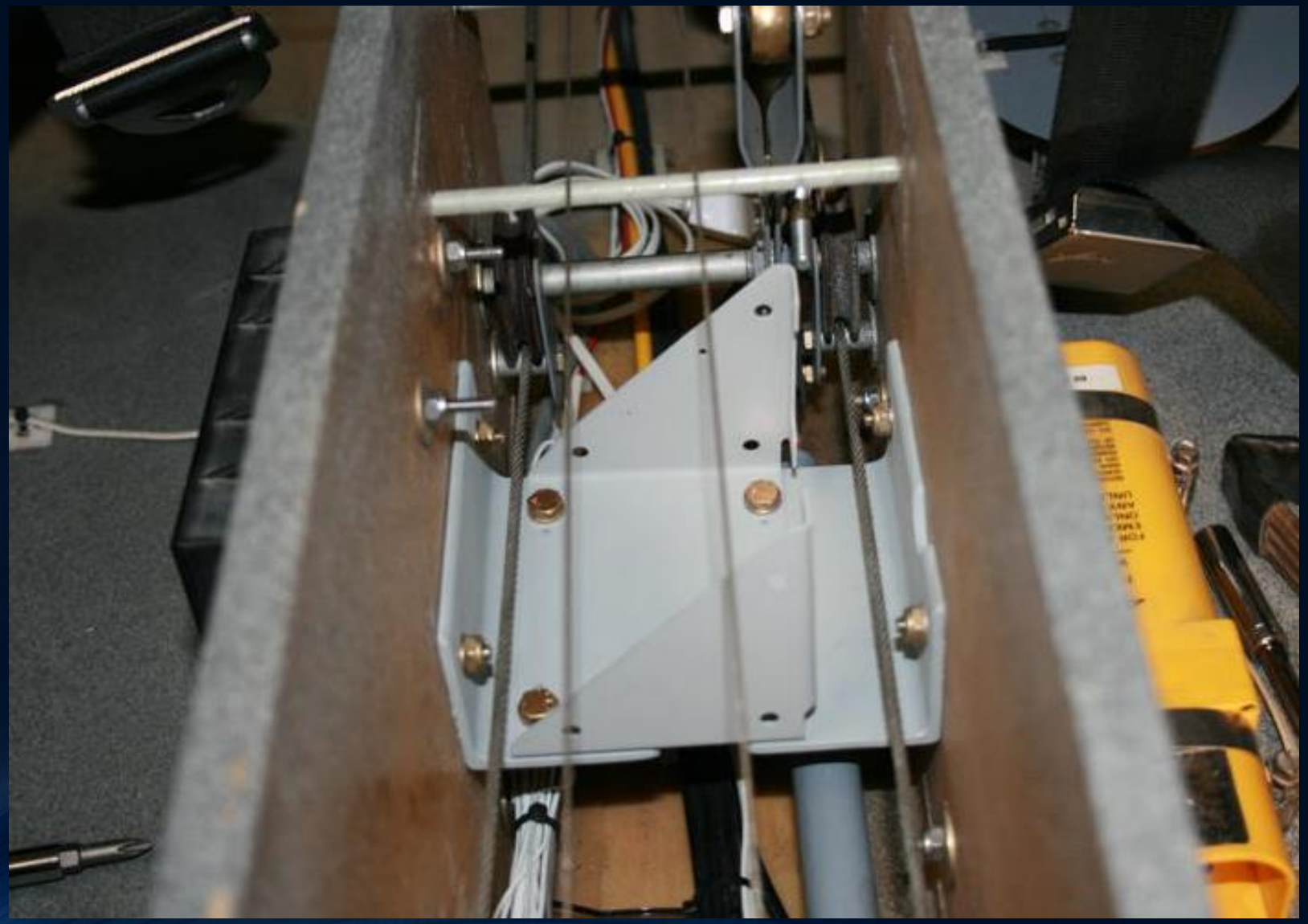




Installation Fundamentals – *Servo's*
Servo Kits

- Dynon sells servo installation kits for:
  - RV4 (pitch), RV6(roll), RV7, RV8, RV9, RV10 (+yaw)
  - Sonex A
- General installation kit for both arm/pushrod and capstan
  - Includes pushrod and mounting hardware
  - I recommend you purchase the RV6 Roll as it includes a basic servo mounting bracket

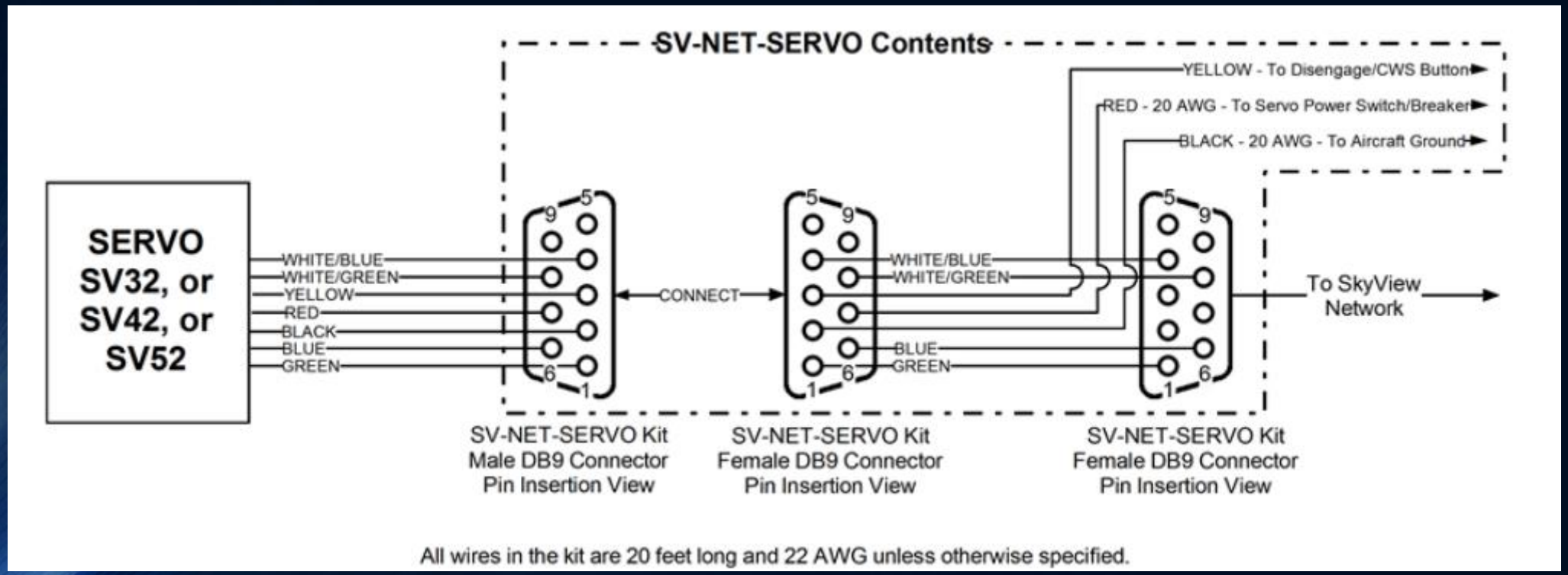
Installation Fundamentals – ***Servo's***
Custom Installations – Glasair IIS



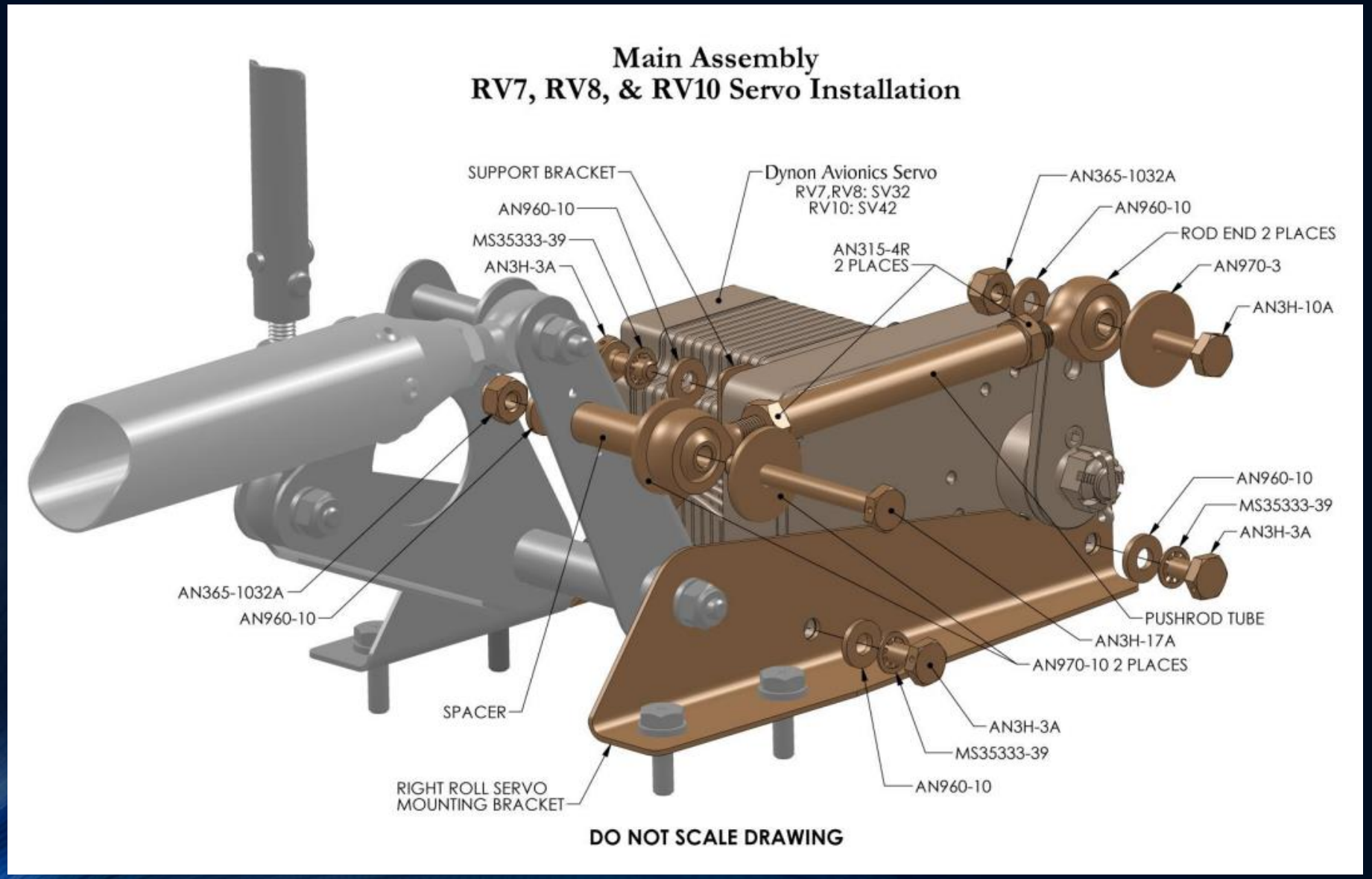
Installation Fundamentals – ***Servo's***
Custom Installations – you tell me

Installation Fundamentals – ***Servo's Wiring***

- Skyview Network CAN NOT power a servo
- Servos require seperate 20AWG (min) wire, longer runs require larger gauge
- Highly recommend dedicated breaker and switch



Questions?


Main Assembly
RV7, RV8, & RV10 Servo Installation
SUPPORT BRACKET
AN960-10
MS35333-39
AN3H-3A
Dynon Avionics Servo
RV7,RV8: SV32
RV10: SV42
AN315-4R
2 PLACES
AN365-1032A
AN960-10
ROD END 2 PLACES
AN970-3
AN3H-10A
AN960-10
MS35333-39
AN3H-3A
PUSHROD TUBE
AN3H-17A
AN970-10 2 PLACES
AN365-1032A
AN960-10
SPACER
AN3H-3A
MS35333-39
AN960-10
RIGHT ROLL SERVO
MOUNTING BRACKET
DO NOT SCALE DRAWING

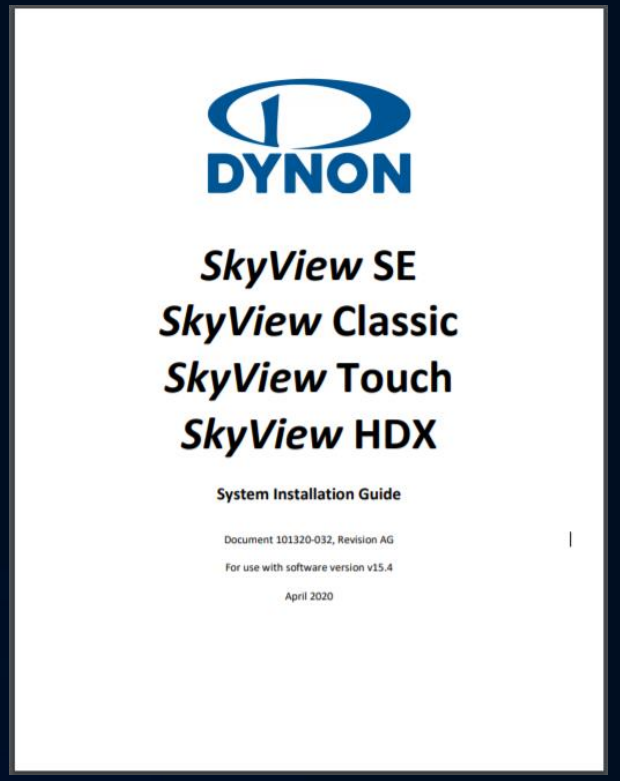
Tools for Success

"D-Sub" Pin Crimper
-Amazon
-Allied Electronics

EAA Membership
- SolidWorks
- Tech Counselor

Nut Plates
-Aircraft Spruce
-Wicks

Installation Manuals


DYNON

SkyView SE
SkyView Classic
SkyView Touch
SkyView HDX

System Installation Guide

Document 101320-032, Revision AG

For use with software version v15.4

April 2020

"Hold my beer and watch this" - What you need to do before you fly

- Pitot/Static System
  - Zero pressure calibration
  - Verify reading is correct at different pressures
  - Leak down test on Pitot/Static system
- GPS signal is sufficient
  - Test outside and away from buildings
  - GPS receivers can only determine direction after move
- Compass calibration
  - Do this in certified location
  - Not near metal buildings or structures
- Radio Check (5 by 5)
  - Clarity and strength
- Transponder certification before first flight
  - VFR – 91.413 "The manufacturer of the aircraft on whic
  - IFR – Requires system test. Don't do IFR your first fligh
- EGT and CHT sensors are correctly located
- Fuel indicators are correctly calibrated

Missing in Action – What I didn't talk about

- Back up Instruments (D30)
- NAV Radio
- Intercom (this is BIG)
- Audio Panel (even BIGGER)
- GPS Navigator integration
- ELT
- OAT
- Position Sensors
- Indicators (canopy, gear, etc)

Information Resources

- Dynon Tech Support
  - 425-402-0433
  - Don Jones – Customer Service Mgr
  - support@dynonavionics.com
  - Put "David Weber" in the subject line it will get to me
  - Facebook (Dynon Avionics Enthusiasts)
- Dynon YouTube Channel
  - How to video
  - Meditation
- Advanced Flight Systems
  - Rob Hickman - Pres
  - rob@advanced-flight-systems.com
  - info@advanced-flight-systems.com
- Dynon Online Forums
  - Check Website for dates and times
- Dynon Newsletter
  - https://www.dynonavionics.com/newsletters.php
- Dynon and AFS Social Media
  - Facebook
  - Instagram
  - Twitter
- Downloads
  - Manuals
  - Product Data Sheets
  - Schematics
  - Software Updates

Thank You!

Presenter – David Weber

See you **OSHKOSH** 2024!

FLYDYNON